Center for Nuclear Studies
Memphis State University

1979
Annual Report of
Nuclear Reactor Operations

License R-127, Docket 50-538
AGN-201 Nuclear Reactor, Serial 108

February, 1980

Center for Nuclear Studies

Memphis State University

1979 ANNUAL REPORT

OF

NUCLEAR REACTOR OPERATIONS

AGN-201 Nuclear Reactor, Serial 108
Facility Operating License R-127, Docket 50-538

Mr. R. L. Dietz
Operations Supervisor
Center for Nuclear Studies

Dr. D. W. Jones
Director
Center for Nuclear Studies

ABSTRACT

The 1979 Annual Report of Nuclear Reactor Operations is prepared in accordance with Technical Specification 6.9 of Appendix A to the Memphis State University Facility Operating License R-127, Docket 50-538. The report includes the period from January 1 to December 31, 1979.

Reactor operations during 1979 were primarily for the purpose of operator training and no new or previously untried experiments were performed. The reactor and associated systems operated as designed and the only safety-related corrective maintenance that was required consisted of replacing the Shield Water Level Interlock Switch. Four unscheduled shutdowns occurred during reactor operations, two of which were considered reportable occurrences as defined in the facility license. Copies of the follow-up reports for these events are contained in Appendix A. Reactivity measurements of the reactor core and radiation survey measurements, included herein, do not significantly differ from those contained in previous reports of serial 108, AGN-201 reactor operations. No changes were made to the reactor which would have affected the facility's description.

Section K of this report contains a statistical summary of personnel exposures pursuant to Chapter 1, Part 20.407, 10CFR.

TABLE OF CONTENTS

APPENDICES

A. REACTOR OPERATING EXPERIENCE

1. Operator Training Programs.

   Sixteen power plant employees participated in programs designed by Memphis State University (MSU) to provide research reactor startup experience for cold license candidates. In addition, 38 students from two classes of MSU's specialized Nuclear Skills Related Training Program performed reactor startups and training exercises as part of that program's normal curriculum. A total of 343 reactor startups were conducted during operations exercises designed specifically for operator training.

2. Staff Operator Training.

   Reactor operations were conducted for the specific purpose of preparing staff operator/instructors for scheduled license examinations. A total of 65 startups were performed during the course of this training. As of December 31, 1979, the MSU Center for Nuclear Studies Staff held three Senior Operator Licenses. In addition, results from license examinations administered to three persons during December were pending final review by the USNRC.

3. Additional operations were conducted for the purpose of satisfying surveillance requirements and routine tests or calibrations. A total of 415 successful reactor startups were performed during the period of this report.

4. TOTAL HOURS OF CRITICAL OPERATION DURING 1979: 141.10

Month	Hours	Max. Power (milliwatts)	Month	Hours	Max. Power (milliwatts)
Jan	50.17	51	Jul	0.45	49
Feb	30.63	42	Aug	0	0
Mar	21.08	46	Sep	0	0
Apr	0	0	Oct	9.01	52
May	0	0	Nov	6.67	42
Jun	8.70	51	Dec	14.39	52

B. UNSCHEDULED REACTOR SHUTDOWNS

A total of four unscheduled reactor scrams were experienced during 1979. However, no operating limits were violated and the maximum delay to training programs or other operations commitments was less than five hours.

1. LOSS OF ELECTRICAL POWER (2). Unplanned interruptions to electric power service to the MSU South Campus caused two reactor shutdowns in the form of silent reactor scrams. In both instances, one in January and the other in March, operator training was in progress and the reactor was slightly supercritical with a period of greater than 300 seconds. The reactor systems performed as designed and the reactor immediately scrammed due to interruption of electrical current to the Control and Safety Rod Holding Magnets. These unplanned shutdowns met criteria for Reportable Occurrences as defined in the Facility Technical Specifications, and a copy of each follow-up report is included herein as Appendix A.

2. CHANNEL 2 LOW LEVEL SCRAM (2). Two reactor scrams were experienced as a result of momentary transients of unknown origin in the Channel 2 Logarithmic Picoammeter. In both cases, one in November and the other in December, the symptoms were identical and the reactor scrammed due to the Channel 2 Low Level Trip Function. The reactor had been critical at a steady power level with an infinite period, when for reasons unknown, spurious transients appeared only in the Channel 2 Picoammeter output signal and actuated the Low Level Trip circuit. In each case, the transient was momentary and the Channel 2 Instrument immediately recovered.

   Troubleshooting efforts failed to reproduce the transients and the results of instrument alignment checks performed immediately after each scram were well within specified tolerances. Comparison of Channel 2 log readings with the Channel 1 and 3 instrument readings at various power levels revealed no abnormal indications. As of the date of this report, subsequent Channel 2 indication has been normal and spurious transients have not been observed.

C. CHANGES IN FACILITY DESIGN, PERFORMANCE CHARACTERISTICS, OR PROCEDURES RELATED TO REACTOR SAFETY

No changes.

D. PREVENTIVE AND CORRECTIVE MAINTENANCE

1. Major Safety-related Corrective Maintenance.

On November 16, 1979, the microswitch associated with the Shield Water Level Float Switch Assembly was replaced as a result of improper operation during a Reactor Pre-startup Test. The corrective action, cause of switch failure, and safety significance of the failure were reported to the Region II Office of Inspection and Enforcement in compliance with the Facility Technical Specifications. A copy of the follow-up report is included herein as Appendix B.

2. Results of Major Surveillance Tests and Inspections.

a. Control Rod Drive Assembly Removal, Inspection and Lubrication: This annual surveillance procedure was satisfactorily completed October 8, 1979. The drive assemblies were found in excellent condition with no evidence of abnormal wear or deterioration.

b. Measurement of Safety and Control Rod Scram and Insertion Times.

This annual surveillance procedure was satisfactorily completed October 11, 1979 with the following results:

	Insertion (cm/sec)	SCRAM Withdrawal (millisec.)
Safety No. 1	.0.491	168
Safety No. 2	0.463	142
Coarse Rod	0.497	156
Fine Rod	0.468	N/A

c. Reactivity Measurements.

Due to operational commitments, this annual surveillance procedure was not completed until January 14, 1980. The results are included in the 1979 report to provide continuity of data.

Parameter		% Reactivity
Control Rod Integral Worth:	Fine	0.32
	Coarse	1.21
Reactivity Insertion Rate:	Safety-1	.036/sec
	Safety-2	.034/sec
	Coarse	.036/sec
	Fine	.009/sec
Excess Reactivity (Glory Hole empty, $20^{o}C$, all rods IN)		0.22
Shutdown Margin (Most reactive rod IN)		2.5

d. Other Maintenance.

On February 10, 1979, the rod drive motor and reduction gear assembly and the Slow Speed Voltage Dropping Resistor for the Coarse Control Rod were replaced. This maintenance was required to correct an irregular audible noise that could be heard during inward rod motion and to correct a tendency for the motor to stall in slow speed when rod insertion reached 20-24 centimeters.

E. CHANGES WHICH WOULD AFFECT THE FACILITY'S DESCRIPTION

No changes.

F. CHANGES TO PROCEDURES

No changes

G. NEW OR UNTRIED EXPERIMENTS

None

H. RADIOACTIVE EFFLUENTS

1. Liquid: None
2. Airborne: None
3. Solid: None

I. ENVIRONMENTAL RADIOLOGICAL SURVEYS PERFORMED OUTSIDE THE FACILITY

Due to operational commitments, the annual General Radiation Survey was not conducted until January 16, 1980. The results of this survey are included in this report to provide continuity of data.

Areas of unrestricted access begin at the outside walls of the reactor room. The maximum detectable level of direct radiation was measured as 0.17 mR/hour (gamma) upon contact with the outside of the east wall. All neutron measurements taken outside the facility were evaluated to be less than 0.1 mrem/hour. Reactor power was steady at 56.3 milliwatts, the maximum obtainable with installed instrumentation, for the entire survey.

Random wipes/smears of surfaces both inside and outside the AGN-201 Facility (normally performed on a weekly basis throughout the year) have not revealed any loose-surface radioactivity.

J. RADIATION EXPOSURES GREATER THAN 100 MILLIREM (50 mrem for persons under 18 years of age)

None

K. PERSONNEL EXPOSURE AND MONITORING (10 CFR 20, Part 407, (a)(2) and Part 407 (b)

1. Personnel monitoring was provided for a total of 72 persons during 1979.

2. Statistical Summary:

Estimated Whole Body Exposure Range (Rems)	Number of Individuals in each range
No measurable exposure	63
Measurable exposure less than 0.1	9
0.1 to 0.25	0
0.25 to 0.5	0
0.5 to 0.75	0
0.75 to 1	0
1 to 2	0
2 to 3	0
3 to 4	0
4 to 5	0
5 to 6	0
6 to 7	0
7 to 8	0
8 to 9	0
9 to 10	0
10 to 11	0
11 to 12	0
12 +	0

FOLLOW-UP REPORTS 79-1, 79-2 TO MSU AGN-201 REACTOR FACILITY REPORTABLE OCCURRENCES

APPENDIX A
(8 pps.)

MEMPHIS STATE UNIVERSITY
AGN-201 NUCLEAR REACTOR FACILITY
LICENSE R-127, DOCKET NO. 50-538

FOLLOW-UP REPORT TO REPORTABLE OCCURRENCE NO. 79-1

Date of Report: January 29, 1979
Date of Occurrence: January 25, 1979
Date NRC Notification: January 25, 1979

1. Reactor.

AGN-201, serial 108. Located at the Center for Nuclear Studies, Memphis State University, Memphis, Tennessee. Facility Operating License R-127, Docket No. 50-538.

2. Reportable Occurrence.

Electric power service to the Memphis State University South Campus was interrupted as a result of outside contractor demolition and construction activities. The unscheduled power outage occurred during AGN-201 reactor operation and, as a direct result of the event, caused reactor shutdown in the form of a silent reactor scram. Item 6.9.2.a.(7) of the Facility Technical Specifications applies.

3. Conditions at Time of Occurrence.

a. An operator training program was in progress for the purpose of providing reactor startup experience for prospective licensees.

b. The reactor was supercritical with period 355 seconds at a power level of 4.8 milliWatts. Safety Rods were fully inserted (24 cm), Coarse Control Rod at 22.97 cm, Fine Control Rod at 16.40 cm, and reactor temperature was 19°C. A lucite sample (1 in. x .87 in. dia.) containing .12 grams H_3BO_3 was installed in the small diameter experiment port at a position five inches from the core centerline.

4. Narrative.

At 9:51 a.m., CST, on January 25, 1979, contractor demolition and construction activities resulted in an electrical power outage to the entire South Campus of Memphis State University. The AGN-201 Reactor, located on South Campus, was being operated by a student operator under the direct supervision of licensed Senior Operators for the purpose of measuring reactivity importance functions. At the time of the unplanned event, the operator was increasing reactor power to achieve a convenient level at which to make a determination of the reactivity effect from a lucite sample containing .12 grams H_3BO_3. This exercise was being conducted as part of an approved operator training program.

The reactor scrammed, as designed and as required by the technical specifications, due to loss of reactor control power which interrupted electrical current to the Control Rod Holding Magnets. The sound of the Safety and Coarse Control Rods contacting their dashpots (fully withdrawn position) was heard by the operator and Senior Operators in the Control Room, via a microphone located in the reactor skirt area, prior to the announcing/intercom system becoming inoperative. The Fine Control Rod, which has no scram function, remained inserted to 16.40 cm. and the Safety and Coarse Rod Magnet Assemblies remained at the pre-scram positions. The Ra-Be neutron source remained at its withdrawn position. All console instrumentation, alarms, and safety circuits were deenergized. The

reactor room area gamma monitor remained energized via an automatic-actuated, internal battery. Control Room and Reactor Room lighting was provided by the automatic-actuated, battery powered, emergency lighting system.

Confirmation of the reactor's shutdown status was immediately made by conducting a gamma radiation survey in accordance with Facility Emergency Procedure EP-3. Radiation levels at the reactor shield tank were observed to be $\leq$ .02 mR/hr which is less than one-tenth the dose rate expected at 4.8 milliWatts and is approximately the normal background dose rate. The H_3BO_3 sample was removed from the experiment port, the Cadmium-loaded shutdown rod was installed and locked into the experiment port, and the Ra-Be neutron source was manually inserted to its normal shutdown position. The reactor Shutdown Checkoff Procedure (OP-5) was completed to the maximum extent possible. Another more detailed gamma radiation survey was conducted approximately one hour after the incident. Maximum dose-rate observed during this survey was recorded as $\leq$ .01 mR/hr.

The Reactor Supervisor was in the Control Room at the time of the power failure. The Memphis State University Radiation Safety Officer was immediately notified. The event was reported to the USNRC Region II, Office of Inspection and Enforcement, via telephone conversation between the CNS Operations Supervisor and Mr. J. Skolls (11:30 a.m., CST), and confirmed by mailgram to the Director, USNRC Region II (3:07 p.m., EST) in compliance with section 6.9.2.a of the Facility Technical Specifications.

Electric power service was restored to the MSU South Campus at 12:41 p.m., CST. The reactor console was immediately energized to permit the Safety and Coarse Control Rod Magnet Assemblies and the Fine Control Rod to be returned to their fully withdrawn limits. Console instrumentation was energized and the normal

Reactor Shutdown Checkoff Procedure (OP-5) was completed at 12:48 p.m., CST. Following a suitable warmup time, the Reactor Prestartup Checkoff Procedure (OP-2) was performed and no abnormalities were noted. Reactor operation was resumed at 2:06 p.m., CST, January 25, 1979.

5. Safety Significance of the Occurrence.

None. A loss of electrical power de-energizes the Safety and Coarse Control Rod Holding Magnets causing a reactor scram and thus assures safe and immediate shutdown in case of a power outage. Reactor systems performed as designed and as required by technical specification 3.3.

6. Cause of Failure.

The electric power outage was a result of outside contractor demolition and construction activities which interrupted the main service feeder to the entire MSU South Campus.

7. Corrective Action.

None. Corrective action to restore the South Campus electric service feeder was performed by MSU Physical Plant personnel and is under the cognizance and control of organizations outside the Center for Nuclear Studies and the AGN-201 Reactor Facility.

8. Measures to Prevent Recurrence.

None. Measures to prevent recurrence of an electric power outage of the nature described in this report are not within the capabilities of the Center for Nuclear Studies or AGN-201 Reactor Facility staff.

9. Similar Reportable Occurrences.

None.

Prepared by: _____
Reactor Supervisor

MEMPHIS STATE UNIVERSITY
AGN-201 NUCLEAR REACTOR FACILITY
LICENSE R-127, DOCKET NO. 50-538

FOLLOW-UP REPORT TO REPORTABLE OCCURRENCE No. 79-2

Date of Repor March 10, 1979
Date of Occurrence: March 5, 1979
Date NRC Notification: March 5, 1979

1. Reactor.

AGN-201, serial 108. Located at the Center for Nuclear Studies, Memphis State University, Memphis, Tennessee. Facility Operating License R-127, Docket No. 50-538.

2. Reportable Occurrence.

Electric power service to the Memphis State University South Campus was momentarily interrupted. The unscheduled power outage occurred during AGN-201 reactor operation and, as a direct result of the event, caused reactor shutdown in the form of a silent reactor scram. Item 6.9.2.a.(7) of the Facility Technical Specifications applies.

3. Conditions at Time of Occurrence.

a. An operator training program was in progress for the purpose of providing reactor startup experience for prospective licensees.

b. The reactor was supercritical with period 382 seconds (neutron source inserted) at a power level of 2.5 milliWatts. Safety Rods were fully inserted (24 cm), Coarse Control Rod at 23 cm, Fine Control Rod at 16.12 cm, and reactor temperature was 19.6° C.

4. Narrative

At 11:29 a.m., CST, on March 5, 1979, a momentary electrical power outage, with immediate restoration of electric power, occurred to the entire South Campus of Memphis State University. The AGN-201 Reactor, located on South Campus, was being operated by a student operator under the direct supervision of licensed Senior Operators. At the time of the unplanned event, the operator was increasing reactor power to achieve a convenient level at which to obtain precise delayed critical data to complete reactor startup procedural requirements and to verify an estimated critical rod position previously calculated by the student. This exercise was being conducted as part of an approved operator training program.

The reactor scrammed, as designed and as required by technical specifications, due to loss of control power which interrupted electrical current to the Control Rod Holding Magnets. The sound of the Safety and Coarse Control Rods contacting their dashpots (fully withdrawn position) was immediately heard by the operator and Senior Operators in the Control Room via a microphone located in the reactor skirt area. The Fine Control Rod, which has no scram function, remained inserted to 16.12 cm, and the Safety and Coarse Rod Magnet Assemblies remained at the pre-scram positions. All console instrumentation, alarms, and safety circuits were momentarily deenergized and immediately reenergized. Reactor Control Power remained deenergized, as designed, due to the Low Voltage Protected (LVP) Main Control Power Relay which can only be reset by manual operator action.

Reactor Control Power was reenergized by the operator to permit the Safety and Coarse Rod Magnet Assemblies and the Fine Control Rod to be returned to their fully withdrawn limits. The normal Reactor Shutdown Checkoff Procedure (OP-5) was completed at 11:42 a.m., CST. All three channels of neutron flux monitoring instrumentation indicated the normal shutdown neutron level.

The Reactor Supervisor was in the control room at the time of the unplanned event. The facility Director was immediately notified. The event was reported to the USNRC Region II, Office of Inspection and Enforcement, via telephone conversation between the CNS Operations Supervisor and Mr. Cottle (2:05 p.m., CST), and confirmed by mailgram to the Director, USNRC Region II (3:23 p.m., EST) in compliance with section 6.9.2.a of the Facility Technical Specifications.

The reactor Prestartup Checkoff Procedure (OP-2) was performed and no abnormalities were noted. Reactor operation resumed at 1:32 p.m., CST, March 5, 1979.

5. Safety Significance of the Occurrence

None. A loss of electrical power de-energizes the Safety and Coarse Control Rod Holding Magnets causing a reactor scram and thus assures safe and immediate shutdown in case of a power outage. Reactor systems performed as designed and as required by technical specification 3.3.

6. Cause of Failure

The momentary interruption of electrical power was caused by a power perturbation of unknown origin at Memphis Light, Gas and Water Company substation No. 42, which provides electrical service to the MSU South Campus.

7. Corrective Action

None. Corrective action to restore and maintain the South Campus electric service feeder is under the cognizance and control of organizations outside the Center for Nuclear Studies and the AGN-201 Reactor Facility.

8. Measures to Prevent Recurrence

None. Measures to prevent recurrence of an electric power outage of the nature described in this report are not within the capabilities of the Center for Nuclear Studies or AGN-201 reactor Facility staff.

9. Similar Reportable Occurrences.

MSU Follow-up Report #79-1 dated January 29, 1979.

Prepared by: _____

Reactor Supervisor

FOLLOW-UP REPORT 79-3 TO
MSU AGN-201 REACTOR FACILITY
REPORTABLE OCCURRENCES

APPENDIX B
(6 pps.)

MEMPHIS STATE UNIVERSITY

AGN-201 NUCLEAR REACTOR FACILITY

LICENSE R-127, DOCKET NO. 50-538

FOLLOW-UP REPORT TO REPORTABLE OCCURRENCE NO. 79-3

Date of Report: November 26, 1979
Date of Occurrence: November 16, 1979
Initial NRC Notification: November 16, 1979

1. Reactor.

AGN-201, Serial 108. Located at the Center for Nuclear Studies, Memphis State University, Memphis, Tennessee. Facility Operating License No. R-127; Docket No. 50-538.

2. Reportable Occurrence.

Shield Water Level Float Switch Assembly failed to initiate protective trip signal during Prestartup Checkoff. Item 6.9.2.a(5) of the Facility Technical Specifications applies.

3. Conditions at Time of Occurrence.

a. The reactor was shutdown with Cadmium Shutdown Rod installed in the Glory Hole.

b. Shield water level was 8 inches below the highest point on the tank manhole opening which is the normal operating level for the system.

c. Prestartup Checks of the Shield Water Level Safety Channel were in progress per Facility Operating Procedure OP-2.

4. Narrative.

At 1:10 p.m., CST, on November 16, 1979 Prestartup Checks of the AGN-201, Serial 108 Reactor were being performed to verify operability of the Shield Water Level Safety Channel. The check is a Channel Test which consists of manually depressing the water level float to operate an associated microswitch and thereby interrupt the Interlock Line continuity circuit. Interruption of the Interlock Line initiates a protective trip signal by deenergizing the system's main scram relay which removes power from—and/or prevents application of power to—the control rod drive/latch magnets. The Channel Test is performed while the reactor is shutdown and with normal water level in the Shield Tank.

Upon depressing the float to its lowest level, simulating a water level of approximately 9.5 inches below the tank top, the operator did not hear an audible "click" of the associated microswitch which is physically located about 2½ inches above the water line; nor was the Interlock Line continuity circuit interrupted as observed by the Senior Operator stationed at the control console.

Operation of the reactor was prohibited. The event was reported to the Region II, U. S. Nuclear Regulatory Commission Office of Inspection and Enforcement via telephone conversation between the AGN-201 Reactor Supervisor and Mr. Paul J. Kellogg, and confirmed by mailgram on November 16, 1979 in accordance with Section 6.9.2a of the Facility Technical Specifications.

Maintenance records indicate that the microswitch had been installed by MSU personnel on September 15, 1978 as part of a routine surveillance procedure. The Shield Water Level Safety Channel had been calibrated to initiate a reactor scram at a water level of 9¼ inches below the highest point on the manhole

opening, which conforms to the Limiting Conditions for Operation specified in Table 3.1 of the Facility Technical Specifications. Subsequent Channel Tests required by Item 4.2.d of the Technical Specifications had been satisfactorily performed at least once each month, the trip set-point verified annually, and Channel Tests satisfactorily conducted during approximately 90 Prestartup Checkoffs since the time of switch installation. The most recent satisfactory Channel Test had been performed within 27 hours of the time of failure.

The microswitch was replaced with a new switch of the same type, was tested satisfactorily, and normal operations were resumed at approximately 2:30 p.m., CST, on November 16, 1979.

5. Safety Significance of the Occurrence.

In the event of a shield water leak, failure of the Shield Water Level Safety Channel to initiate a reactor scram at water levels > 10.5 inches below the highest point on the manhole opening during critical operation would have violated the specified Limiting Conditions for Operation; and at levels greater than 12 inches below the top of the tank, adequate biological shielding would not be provided during reactor operation as specified by the Safety Limit of item 2.1, Technical Specifications.

At normal operating power, an undetected loss of shield water could increase the gamma dose-rate at the reactor exterior by a factor of 7-8, and the neutron background by a factor of several hundred. Compounding an undetected loss of shield water with a nuclear runaway and additional scram circuit failure could result in an exposure of 200-300 Rem of fast neutrons to a person standing next to the reactor. (Reactor Hazards Summary Report for the AGN-201 Nuclear Reactor: Aerojet-General Nucleonics Report No. 23, Revised April 1, 1959.)

6. Redundancy.

There is no design redundancy in the Shield Water Level Safety Channel. However, a loss of shield water would be indicated by the following additional means:

a. Prior to Startup

(1) Shield tank level is verified at the proper level by visual observation and documented as part of each Pre-Startup Checkout.

(2) Visual inspection of areas which would receive shield water leakage is made and documented as part of each Pre-Startup Checkout.

(3) An increase in radiation levels may be observed during Pre-Startup radiation survey.

b. During Operation

(1) An increase in reactor room radiation levels sufficient to activate the facility evacuation alarm would be detected by the area gamma monitor located approximately 6 feet from the reactor.

(2) Shield water levels below ~ 20 inches from the tank top are visible from the control room via a viewing window directly in front of the AGN console and viewing window in the reactor shield tank (Operator is approximately 17 feet from shield tank 32½ x 27½ inch viewing window).

7. Cause of Failure.

Gradual buildup of corrosion products in the internal operating mechanism of the microswitch due to its location in the humid atmosphere of the shield tank resulted in the internal switch operating lever being stuck to the ceramic switch housing (Figure 1). Spring pressure, which normally opens the active switch contacts when the float operating arm permits movement of the microswitch plunger, was insufficient to overcome the corrosion effects; thus, [illegible] interruption of of the Interlock Line.

8. Corrective Action.

The microswitch was replaced with a new switch of the same type on November 16, 1979.

Manufacturer: Micro-Switch Company; Freeport, Illinois
Type: V3-101, SPDT, 0.5 A @ 125 volts D.C.
Mechanical Life: 10,000,000 cycles
Minimum Release Force: 2 oz.

9. Measures to Prevent Recurrence.

The microswitch casing is of riveted construction which precludes periodic disassembly and cleaning of switch internals. Thus, the availability of a model more suitable to a humid environment or a model constructed such that periodic cleaning of switch internals is possible will be investigated. If installation of such a switch is not feasible, then routine replacement of the microswitch with a switch of the same type on an annual basis will be incorporated into the facility surveillance procedures.

10. Applicability to Other Equipment in the Reactor System.

None. Microswitches of similar internal construction but with different terminal connectors and actuating mechanisms are utilized for interlocks and position indication devices in the Rod Control System. However, due to their location outside the humid atmosphere characteristic of the Shield Tank and due to the greater frequency with which they are exercised during normal reactor operation, it is anticipated that corrosion will not be a problem throughout the mechanical life of the switches.

11. Similar Reportable Occurrences.

MSU Followup Report dated June 27, 1977.

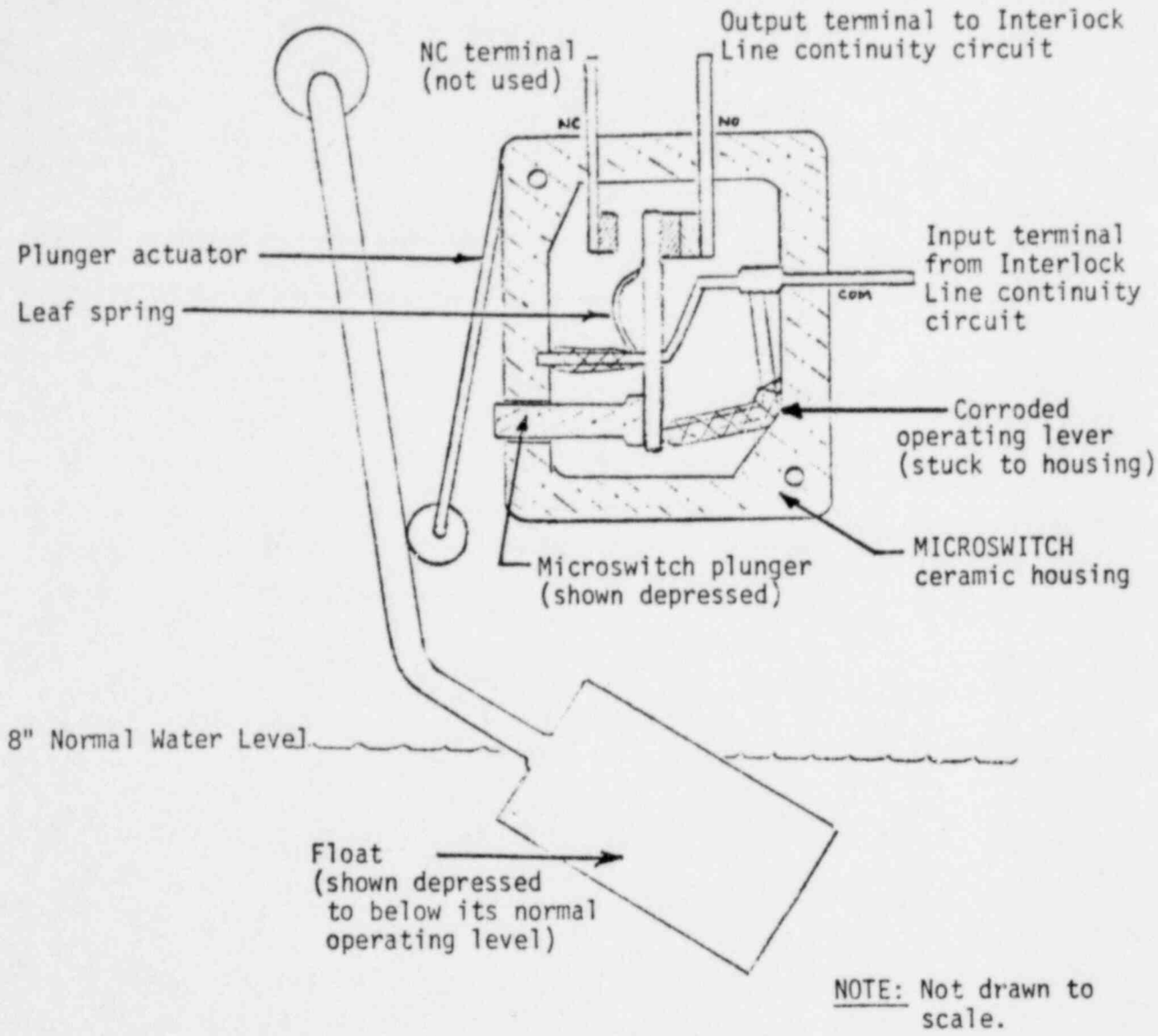

FIGURE 1. Shield Tank Float Switch Assembly (Microswitch shown in failed position)